

## CLAIMS

What is claimed is:

1. A dust collecting apparatus for an air conditioner, comprising:  
an ionizer to electrically charge dust particles in air; and  
a metal filter having a plurality of metal fibers, disposed at a predetermined distance from a back of the ionizer, the metal filter having a polarity opposite to that of the charged dust particles to electrically collect the dust particles.
2. The dust collecting apparatus of claim 1, wherein electric discharge is generated in the ionizer in all directions, electrically charging broad regions of external dust particles to increase collection efficiency by about 10%.
3. The dust collecting apparatus of claim 1, wherein the ionizer comprises:  
a discharge electrode; and  
a plurality of ground electrodes positioned at either side of the discharge electrode, wherein the dust particles are ionized while corona discharge occurs between the discharge electrode and the ground electrodes by application of a sufficiently high voltage to the discharge electrode.
4. The dust collecting apparatus of claim 3, wherein the ionizer is a wire brush type of ionizer having a wire-shaped discharge electrode to which the high voltage is applied, and ground electrodes cylindrically surrounding the wire-shaped discharge electrode to increase an ionizing area of inflow air.
5. The dust collecting apparatus of claim 3, wherein the ground electrodes of the ionizer are spaced apart a predetermined distance and parallel to an air stream, and the discharge electrode is a needle-shaped discharge electrode that is disposed between the ground electrodes.
6. The dust collecting apparatus of claim 1, wherein the metal fibers of the metal filter have gaps sufficiently narrow therebetween to provide electrical force and mechanical force to collect the dust particles onto the metal filter.

7. The dust collecting apparatus of claim 1, wherein one of the metal fibers of the metal filter performs an air sterilization operation.

8. The dust collecting apparatus of claim 7, wherein the metal fiber performing the air sterilization operation is a material selected from the group consisting of silver (Ag), aluminum (Al), copper (Cu), iron (Fe), zinc (Zn), cadmium (Cd), palladium (Pd), rhodium (Rh), and chrome (Cr).

9. The dust collecting apparatus as defined in claim 7, wherein one of the metal fibers of the metal filter removes volatile organic compounds (VOCs) from air.

10. The dust collecting apparatus as defined in claim 7, wherein one of the metal fibers of the metal filter removes odors from air.

11. The dust collecting apparatus of claim 1, wherein one of the metal fibers of the metal filter removes volatile organic compounds (VOCs) from the air.

12. The dust collecting apparatus of claim 11, wherein the metal fiber that removes the VOCs is a material selected from the group consisting of copper (Cu), platinum (Pt), and nickel (Ni).

13. The dust collecting apparatus of claim 11, wherein one of the metal fibers of the metal filter removes odors from the air.

14. The dust collecting apparatus of claim 13, wherein the metal fiber that removes odors is a material selected from the group consisting of titanium oxide (TiO<sub>2</sub>), vanadium (V), zinc (Zn), and gold (Au).

15. The dust collecting apparatus of claim 1, wherein one of the metal fibers of the metal filter removes odors from the air.

16. The dust collecting apparatus of claim 1, wherein a surface of the metal filter is coated with silver (Ag) nanoparticles.

17. The dust collecting apparatus as defined in claim 16, further comprising a mesh metal filter disposed in front of or behind the metal filter.

18. The dust collecting apparatus of claim 1, further comprising a mesh metal filter disposed in front of or behind the metal filter to support the metal filter.

19. The dust collecting apparatus as defined in claim 1, wherein the metal filter is in a form of a sheet by compressing open the metal fibers.

20. A dust collecting apparatus for an air conditioner, comprising:  
an ionizer to electrically charge dust particles in air;  
a metal filter having a plurality of metal fibers, disposed at a predetermined distance from a back of the ionizer; and  
an electrostatic filter generating static electricity, disposed between the ionizer and the metal filter,  
wherein the metal filter has a polarity opposite to that of the charged dust particles to electrically collect the dust particles.

21. The dust collecting apparatus of claim 20, wherein one of the metal fibers of the metal filter performs an air sterilization operation.

22. The dust collecting apparatus of claim 21, wherein the metal fiber performing the air sterilization operation is a material selected from the group consisting of silver (Ag), aluminum (Al), copper (Cu), iron (Fe), zinc (Zn), cadmium (Cd), palladium (Pd), rhodium (Rh), and chrome (Cr).

23. The dust collecting apparatus as defined in claim 21, wherein one of the metal fibers of the metal filter removes volatile organic compounds (VOCs) from air.

24. The dust collecting apparatus as defined in claim 21, wherein one of the metal fibers of the metal filter removes odors from air.

25. The dust collecting apparatus of claim 20, wherein one of the metal fibers of the metal filter removes volatile organic compounds (VOCs) from the air.

26. The dust collecting apparatus of claim 25, wherein the metal fiber that removes the VOCs is a material selected from the group consisting of copper (Cu), platinum (Pt), and nickel (Ni).

27. The dust collecting apparatus of claim 25, wherein one of the metal fibers of the metal filter removes odors from the air.

28. The dust collecting apparatus of claim 27, wherein the metal fiber that removes odors is a material selected from the group consisting of titanium oxide ( $\text{TiO}_2$ ), vanadium (V), zinc (Zn), and gold (Au).

29. The dust collecting apparatus of claim 20, wherein one of the metal fibers of the metal filter removes odors from the air.

30. The dust collecting apparatus of claim 20, wherein a surface of the metal filter is coated with silver (Ag) nanoparticles.

31. The dust collecting apparatus as defined in claim 30, further comprising a mesh metal filter disposed in front of or behind the metal filter.

32. The dust collecting apparatus of claim 20, further comprising a mesh metal filter disposed in front of or behind the metal filter to support the metal filter.

33. The dust collecting apparatus of claim 20, wherein the metal filter is formed as a sheet by compressing open the metal fibers.

34. An air cleaner having a dust collecting apparatus, the dust collecting apparatus comprising:  
an ionizer to electrically charge dust particles in air; and  
a metal filter having a plurality of metal fibers, disposed at a predetermined distance from a back of the ionizer, the metal filter having a polarity opposite to that of the charged dust particles to electrically collect the dust particles.

35. An air cleaner having a dust collecting apparatus, the dust collecting apparatus comprising:  
an ionizer to electrically charge dust particles in air;  
a metal filter having a plurality of metal fibers, disposed at a predetermined distance from a back of the ionizer; and  
an electrostatic filter generating static electricity, disposed between the ionizer and the metal filter,  
wherein the metal filter has a polarity opposite to that of the charged dust particles to electrically collect the dust particles.

36. A dust collecting apparatus for an air conditioner having an ionizer to electrically charge dust particles in air, the dust collecting apparatus comprising a metal filter,  
wherein the metal filter has a polarity opposite to that of the charged dust particles to electrically collect the dust particles, and  
wherein the metal filter comprises a plurality of metal fibers with gaps sufficiently narrow therebetween to collect the dust particles using mechanical force, regardless of whether the ionizer is operating properly.

37. The dust collecting apparatus of claim 9, wherein the metal fiber that removes the VOCs is a material selected from the group consisting of copper (Cu), platinum (Pt), and nickel (Ni).

38. The dust collecting apparatus of claim 9, wherein one of the metal fibers of the metal filter removes odors from the air.

39. The dust collecting apparatus of claim 38, wherein the metal fiber that removes odors is a material selected from the group consisting of titanium oxide (TiO<sub>2</sub>), vanadium (V), zinc (Zn), and gold (Au).

40. The dust collecting apparatus of claim 23, wherein the metal fiber that removes the VOCs is a material selected from the group consisting of copper (Cu), platinum (Pt), and nickel (Ni).

41. The dust collecting apparatus of claim 23, wherein one of the metal fibers of the metal filter removes odors from the air.

42. The dust collecting apparatus of claim 41, wherein the metal fiber that removes odors is a material selected from the group consisting of titanium oxide ( $\text{TiO}_2$ ), vanadium (V), zinc (Zn), and gold (Au).